Chapter 3. Patient Safety

Importance and Measures

Morbidity and Mortality

- A 1999 report by the Institute of Medicine, *To Err Is Human,* estimated that 44,000 to 98,000 Americans die each year as a result of medical errors, making it the eighth leading cause of death.[1]
- A recent study reported that at least 32,000 Americans die in the hospital each year due to 18 types of medical injuries.[2]

Cost

- The cost attributable to medical errors is as much as $29 billion annually in lost income, disability, and health care costs.[1]

Measures

Much progress has been made in recent years in raising awareness, developing event reporting systems, and developing national standards for data collection. However, data remain incomplete for a comprehensive national assessment of patient safety.[3] Nevertheless, several measures are available to provide insight into the level of patient safety in the United States. This section highlights NHQR patient safety measures in three areas:

- Hospital-acquired (nosocomial) infections
- Adverse events and postoperative complications of care
- Inappropriate use of medications by the elderly

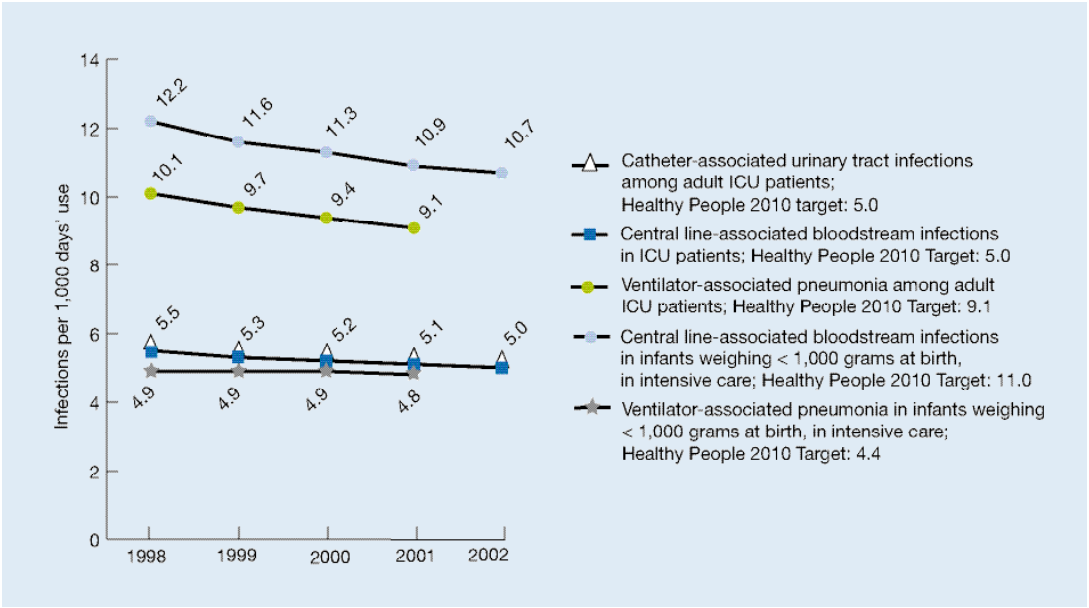
The measures reviewed are based on data from the CDC's National Nosocomial Infection Surveillance (NNIS) System,[4] AHRQ's Patient Safety Indicators applied to the HCUP Nationwide Inpatient Sample (NIS),[5] CMS's Medicare Patient Safety Monitoring System (MPSMS),[6] and AHRQ's Medical Expenditure Panel Survey (MEPS).[7]

Findings

Hospital-Acquired (Nosocomial) Infections

Infections acquired in the process of care, or nosocomial infections, are one of the most serious patient safety concerns. This is especially true in some care settings, such as intensive care units (ICUs), and for some procedures, such as central vascular catheters (CVCs).

Figure 3.1. Nosocomial infections in ICU patients, 1998-2002



Source: Centers for Disease Control and Prevention, National Nosocomial Infection Surveillance (NNIS) System.

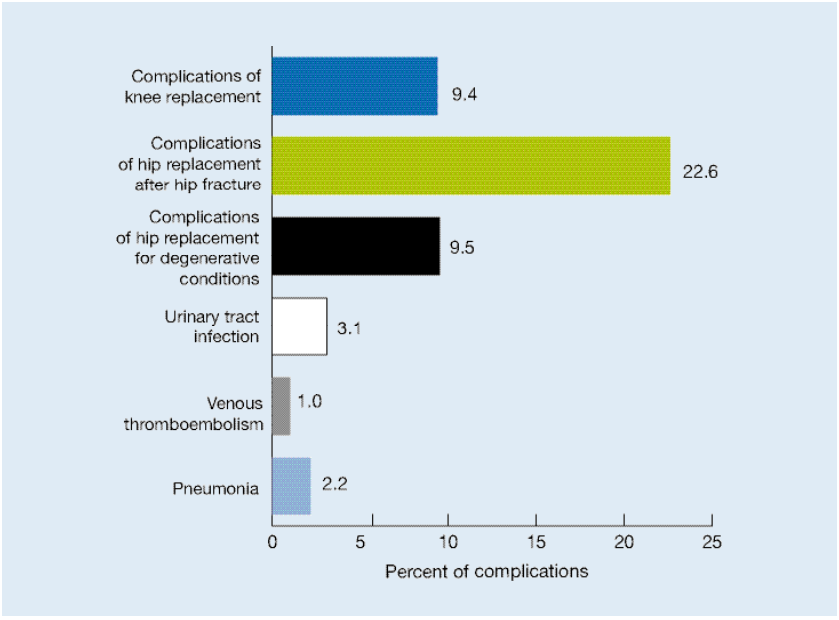
Note: The lines for catheter-associated urinary tract infections and central-line bloodstream infections in ICU patients overlap. Both ventilator-associated pneumonia measures were redefined in 2002; thus data for these two measures for 2002 are not presented in this chart.

- NNIS data show that hospital-acquired infections in some types of ICUs have gradually declined from 1998 to 2002 (Figure 3.1). The targets set for Healthy People 2010[8] for four of the five measures tracked through NNIS were met by 2002.
- High risk is associated with the use of CVCs and ventilators. In 2002, 2.4% of CVC procedures resulted in infections at the insertion sites, 1.5% of CVC procedures resulted in bloodstream infections, and 7.9% of ventilator uses caused pneumonia (MPSMS, 2002).

Adverse Events and Postoperative Complications of Care

Adverse events and postoperative complications may be exacerbated by or related to a patient's underlying condition, but many complications can be avoided if adequate care is provided.

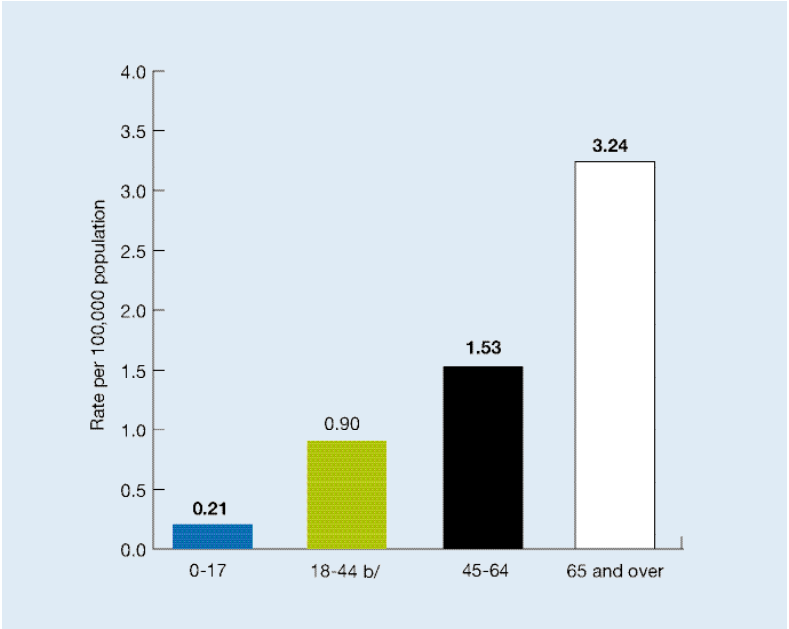
Figure 3.2. Prevalence of selected postoperative complications, 2002



Source: Centers for Medicare & Medicaid Services, Medicare Patient Safety Monitoring System, 2002.

- Nearly 1 in 10 total hip replacements for degenerative conditions and 1 in 10 knee replacement operations have complications of various severity including infection, hemotoma, or death (Figure 3.2).
- The higher complication rate for hip replacement after hip fracture (23%) suggests that the development of adverse events is also determined by the severity of patient condition.
- Postoperative pneumonia, venous thromboembolism, and urinary tract infections are among the most common risks in surgical patients.

Figure 3.3. Prevalence of foreign body left in during procedure, by age, 2001



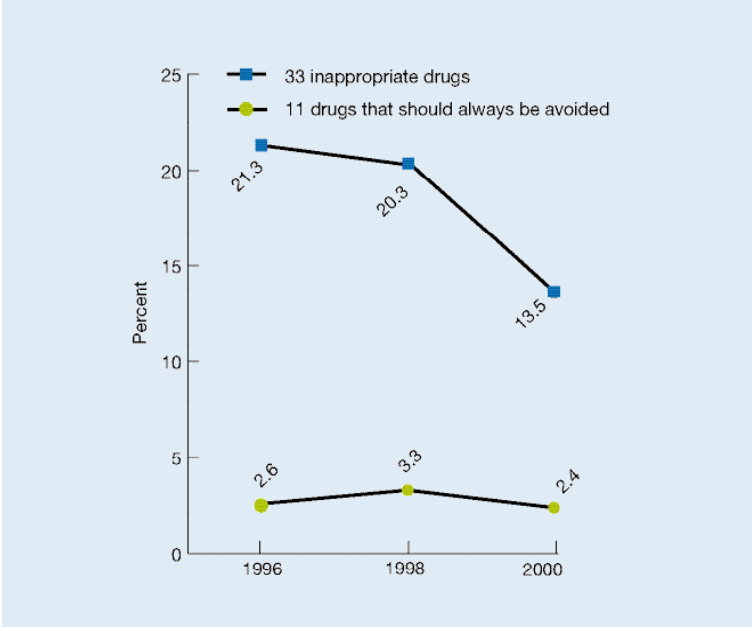
Source: Agency for Healthcare Research and Quality, HCUP Nationwide Inpatient Sample, 2001.
Note: Boldface rate is statistically different from b/; adjusted by gender.

- About 1 case of foreign body left in after procedure, either retained during current hospitalization or a previous hospitalization, was discovered in eve ry 100,000 persons in 2001, declining from 1.4 per 100,000 population in 1994 (HCUP 1994-2001).
- Foreign bodies left in after procedure were more likely to be detected in elderly patients (Figure 3.3).
- Mechanical adverse events such as perforation occurred in 3.3% of CVC procedures in 2002 (MPSMS, 2002).

Inappropriate Use of Medications by the Elderly

Adverse drug events bring serious risk to patients, but the magnitude of this problem is difficult to assess.[9] Examination of whether doctors take precautions when prescribing drugs and the extent to which medicines that are inappropriate and potentially harmful to patients are prescribed are alternative ways to assess safe use of medication.

Figure 3.4. Inappropriate use of medications by the elderly, 1996-2000



Source: Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, 1996-2000.

- The percentage of community dwelling elderly American who had at least 1 of the 33 drugs considered potentially inappropriate for the elderly[10] declined from 21.3% in 1996 to 13.5% in 2000, while the percentages of the elderly that had 1 of 11 drugs that should always be avoided by the elderly[10] remained at 2.4%-2.6% (Figure 3.4).
- Of people with a usual source of care, 25.5% of elderly respondents reported that their usual source of care did not ask them about medications prescribed by other doctors in 2001 (MEPS, 2001; see Tables Appendix, Table 2.38).

List of Measures: Patient Safety

Measure	Year	National estimate	National table number	State table number
Complications of care:				
Birth trauma (injury to neonate) per 1,000 live births	2001	7.358	2.1	xxx
Deaths per 1,000 admissions in low mortality DRG	2001	0.628	2.2	xxx
Failure to rescue (deaths) per 1,000 discharges with complications potentially resulting from care)	2001	136.630	2.3	xxx
Transfusion reactions per 1,000 discharges	2001	0.004	2.4a	xxx
Transfusion reactions per 100,000 population	2001	0.054	2.4b	xxx
Foreign body accidentally left in body during procedure per 1,000 discharges	2001	0.085	2.5a	xxx
Foreign body accidentally left in body during procedure per 100,000 population	2001	1.143	2.5b	xxx
Central line-associated bloodstream infection in ICU patients (%)	2002	5.0	2.6	xxx
Central line-associated bloodstream infection in infants weighing 1,000 grams or less at birth in intensive care (%)	2002	10.7	2.7	xxx
Complications of anesthesia per 1,000 surgical discharges	2001	0.802	2.8	xxx
Decubitus ulcer per 1,000 discharges of length 5 or more days	2001	22.988	2.9	xxx
Iatrogenic pneumothorax per 1,000 discharges	2001	0.753	2.10a	xxx
Iatrogenic pneumothorax per 100,000 population	2001	8.495	2.10b	xxx
Selected infections due to medical care per 1,000 discharges	2001	1.877	2.11a	xxx
Selected infections due to medical care per 100,000 population	2001	39.826	2.11b	xxx
Postoperative hip fracture per 1,000 surgical patients age 18 years or older	2001	0.640	2.12	xxx
Postoperative hemorrhage or hematoma per 1,000 surgical discharges	2001	2.153	2.13	xxx
Postoperative physiologic and metabolic derangements per 1,000 elective-surgery patients	2001	1.035	2.14	xxx
Postoperative respiratory failure per 1,000 elective surgery patients	2001	3.541	2.15	xxx
Postoperative pulmonary embolism or deep vein thrombosis per 1,000 surgical discharges	2001	8.615	2.16	xxx
Postoperative sepsis per 1,000 elective surgery discharges	2001	10.079	2.17	xxx
Accidental puncture or laceration during procedures per 1,000 discharges	2001	3.535	2.18a	xxx
Accidental puncture or laceration during procedures per 100,000 population	2001	36.800	2.18b	xxx
Reclosure of postoperative disruption of abdominal wall per 1,000 abdominopelvic surgery discharges	2001	2.282	2.19a	xxx
Reclosure of postoperative disruption of abdominal wall per 100,000 population	2001	1.716	2.19b	xxx
Obstetrical trauma per 1,000 instrument-assisted vaginal deliveries	2001	239.454	2.20	xxx
Obstetrical trauma per 1,000 vaginal deliveries without instrument assistance	2001	82.593	2.21	xxx
Obstetrical trauma per 1,000 cesarean deliveries	2001	5.715	2.22	xxx

Measure	Year	National estimate	National table number	State table number
Complications of care: *(continued)*				
Catheter-associated urinary tract infection in intensive care unit patients (%)	2002	5.0	2.23	xxx
Ventilator-associated pneumonia in intensive care unit patients (%)	2002	5.9	2.24	xxx
Ventilator-associated pneumonia in infants weighing 1,000 g or less at birth in intensive care (%)	2002	3.1	2.25	xxx
Postoperative venous thromboembolic events (%)	2002	1.0	2.26	xxx
Postoperative pneumonia events (%)	2002	2.2	2.27	xxx
Mechanical adverse events associated with central vascular catheters (CVCs) (%)	2002	3.3	2.28	xxx
Insertion-site infections associated with central vascular catheters (CVCs) (%)	2002	2.4	2.29	xxx
Bloodstream infections (BSIs) associated with central vascular catheters (CVCs) (%)	2002	1.5	2.30	xxx
Postoperative urinary tract infections (UTIs) (%)	2002	3.1	2.31	xxx
Ventilator-associated pneumonia (VAP) events (%)	2002	7.9	2.32	xxx
Hospital-acquired bloodstream infections (BSIs) (%)	2002	0.4	2.33	xxx
Adverse events associated with hip joint replacement due to degenerative conditions (%)	2002	9.5	2.34	xxx
Adverse events associated with hip joint replacement due to fracture (%)	2002	22.6	2.35	xxx
Adverse events associated with knee replacement (%)	2002	9.4	2.36	xxx
Prescribing medications:				
Community dwelling elderly who had at least 1 of 33 inappropriate drugs (%)	2000	13.5	2.37a	xxx
Community dwelling elderly who had at least 1 of 11 drugs that should always be avoided by the elderly (%)	2000	2.42	2.37b	xxx
Patients who report that usual source of care asks about Rx from other providers (%)	2001	81.6	2.38	xxx

Note: See Tables Appendix for national and State tables listed above.

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